

SLOVENSKI STANDARD

SIST EN 61158-5-3:2012

01-september-2012

Nadomešča:

SIST EN 61158-5-3:2008

Industrijska komunikacijska omrežja - Specifikacije za procesno vodilo - 5-3. del: Definicija opravil na aplikacijskem nivoju - Elementi tipa 3 (IEC 61158-5-3:2010)

Industrial communication networks - Fieldbus specifications - Part 5-3: Application layer service definition - Type 3 elements (IEC 61158-5-3:2010)

Industrielle Kommunikationsnetze - Feldbusse - Teil 5-3: Dienstfestlegungen des Application Layer (Anwendungsschicht) - Typ 3-Elemente (IEC 61158-5-3:2010)

Réseaux de communication industriels - Spécifications des bus de terrain - Partie 5-3: Définition des services des couches d'application - Éléments de type 3 (IEC 61158-5-3:2010)

Ta slovenski standard je istoveten z: EN 61158-5-3:2012

ICS:

25.040.40	Merjenje in krmiljenje industrijskih postopkov	Industrial process measurement and control
35.100.70	Uporabniški sloj	Application layer
35.110	Omreževanje	Networking

SIST EN 61158-5-3:2012

en

iTeh STANDARD PREVIEW
(standards.iteh.ai)

[SIST EN 61158-5-3:2012](#)

<https://standards.iteh.ai/catalog/standards/sist/dfef3768-ee25-4c17-97b3-478d57960ad1/sist-en-61158-5-3-2012>

EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 61158-5-3

June 2012

ICS 25.040.40; 35.100.70; 35.110

Supersedes EN 61158-5-3:2008

English version

**Industrial communication networks -
Fieldbus specifications -
Part 5-3: Application layer service definition -
Type 3 elements
(IEC 61158-5-3:2010)**

Réseaux de communication industriels -
Spécifications des bus de terrain -
Partie 5-3: Définition des services des
couches d'application -
Éléments de type 3
(CEI 61158-5-3:2010)

Industrielle Kommunikationsnetze -
Feldbusse -
Teil 5-3: Dienstfestlegungen des
Application Layer (Anwendungsschicht) -
Typ 3-Elemente
(IEC 61158-5-3:2010)

**ITeh STANDARD PREVIEW
(standards.iteh.ai)**

[SIST EN 61158-5-3:2012](https://standards.iteh.ai/catalog/standards/sist/dfef3768-ee25-4c17-97b3-10909c3e2012)

<https://standards.iteh.ai/catalog/standards/sist/dfef3768-ee25-4c17-97b3-10909c3e2012>

This European Standard was approved by CENELEC on 2012-03-28. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CENELEC member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Bulgaria, Croatia, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

CENELEC

European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

Management Centre: Avenue Marnix 17, B - 1000 Brussels

Foreword

The text of document 65C/606/FDIS, future edition 2 of IEC 61158-5-3, prepared by SC 65C, "Industrial networks", of IEC/TC 65, "Industrial-process measurement, control and automation" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN 61158-5-3:2012.

The following dates are fixed:

- latest date by which the document has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2012-12-28
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2015-03-28

This document supersedes EN 61158-5-3:2008.

EN 61158-5-3:2012 includes the following significant technical change with respect to EN 61158-5-3:2008:

- Correction in 6.2.3.2.3.2 (referencing the error-codes in EN 61158-6-3:2012, 5.3.17 to maintain the codes only in one place).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CENELEC [and/or CEN] shall not be held responsible for identifying any or all such patent rights.

[SIST EN 61158-5-3:2012](https://standards.iteh.ai/catalog/standards/sist/dfef3768-ee25-4c17-97b3-478d57960ad1/sist-en-61158-5-3-2012)

<https://standards.iteh.ai/catalog/standards/sist/dfef3768-ee25-4c17-97b3-478d57960ad1/sist-en-61158-5-3-2012>

Endorsement notice

The text of the International Standard IEC 61158-5-3:2010 was approved by CENELEC as a European Standard without any modification.

In the official version, for Bibliography, the following notes have to be added for the standards indicated:

- | | |
|---------------------|--|
| IEC/TR 61158-1:2010 | NOTE Harmonized as CLC/TR 61158-1:2010 (not modified). |
| IEC 61158-6-10:2010 | NOTE Harmonized as EN 61158-6-10:2012 (not modified). |

Annex ZA (normative)

Normative references to international publications with their corresponding European publications

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

NOTE When an international publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 61131-1	-	Programmable controllers - Part 1: General information	EN 61131-1	-
IEC 61158-3-3	2007	Industrial communication networks - Fieldbus specifications - Part 3-3: Data-link layer service definition - Type 3 elements	EN 61158-3-3	2008
IEC 61158-4-3	2010	Industrial communication networks - Fieldbus specifications - Part 4-3: Data-link layer protocol specification - Type 3 elements	EN 61158-4-3	2012
IEC 61158-5-10	2010	Industrial communication networks - Fieldbus specifications - Part 5-10: Application layer service definition - Type 10 elements	EN 61158-5-10	2012
IEC 61158-6-3	2010	Industrial communication networks - Fieldbus specifications - Part 6-3: Application layer protocol specification - Type 3 elements	EN 61158-6-3	2012
ISO/IEC 7498-1	-	Information technology - Open Systems Interconnection - Basic Reference Model: The Basic Model	-	-
ISO/IEC 8822	-	Information technology - Open Systems Interconnection - Presentation service definition	-	-
ISO/IEC 8824	-	Information technology - Open Systems Interconnection - Specification of Abstract Syntax Notation One (ASN.1)	-	-
ISO/IEC 9545	-	Information technology - Open Systems Interconnection - Application Layer structure	-	-
ISO/IEC 10731	-	Information technology - Open Systems Interconnection - Basic reference model - Conventions for the definition of OSI services	-	-

iTeh STANDARD PREVIEW
(standards.iteh.ai)

[SIST EN 61158-5-3:2012](#)

<https://standards.iteh.ai/catalog/standards/sist/dfef3768-ee25-4c17-97b3-478d57960ad1/sist-en-61158-5-3-2012>



IEC 61158-5-3

Edition 2.0 2010-08

INTERNATIONAL STANDARD



**Industrial communication networks – Fieldbus specifications –
Part 5 3: Application layer service definition – Type 3 elements**

STANDARD PREVIEW
(standards.iteh.ai)

SIST EN 61158-5-3:2012
<https://standards.iteh.ai/catalog/standards/sist/dfef3768-ee25-4c17-97b3-478d57960ad1/sist-en-61158-5-3-2012>

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

PRICE CODE **XP**

ICS 25.04.40; 35.100.70; 35.110

ISBN 978-2-88912-106-9

CONTENTS

FOREWORD.....	11
INTRODUCTION.....	13
1 Scope.....	14
1.1 General.....	14
1.2 Overview.....	14
1.3 Specifications.....	15
1.4 Conformance.....	15
2 Normative references.....	15
3 Terms, definitions, abbreviations, symbols and conventions.....	16
3.1 Referenced terms and definitions.....	16
3.2 Fieldbus Application Layer type 3 – specific terms and definitions.....	17
3.3 Abbreviations and symbols.....	25
3.4 Conventions.....	25
4 Concepts.....	32
5 Data type ASE.....	32
6 Communication model specification.....	32
6.1 DP concepts.....	32
6.2 ASEs.....	52
6.3 Summary of FAL classes.....	430
6.4 Permitted FAL services by AREP role.....	431
6.5 Conformance classes.....	435
6.6 Application characteristics.....	436
Bibliography.....	438
Figure 1 – Example of DP communication with a single controlling device.....	35
Figure 2 – Example of DP communication with several controlling devices.....	35
Figure 3 – Example of DP communication between field devices.....	36
Figure 4 – DP-slave model (modular DP-slave).....	38
Figure 5 – DP-slave model (compact DP-slave).....	39
Figure 6 – Overview of application processes.....	40
Figure 7 – DP-slave model (modular DP-slave).....	41
Figure 8 – Application Service Elements (ASEs).....	43
Figure 9 – Application Process with application Objects (APOs).....	44
Figure 10 – Access to a remote APO.....	45
Figure 11 – Access to a remote APO for publisher/subscriber association.....	46
Figure 12 – Example of one AR with two AREPs.....	47
Figure 13 – Relation of a simple process data object to the real object.....	53
Figure 14 – Relation of a combined process data object to the real objects.....	55
Figure 15 – Sequence of an isochronous DP cycle with one DP-master (class 1).....	86
Figure 16 – Additional time relationships in a DP system operating in isochronous mode.....	88
Figure 17 – DP system with optimized isochronous DP cycle.....	89
Figure 18 – Buffered synchronized isochronous mode at the DP-master (class 1).....	91

Figure 19 – Enhanced synchronized isochronous mode at the DP-master (class 1)	92
Figure 20 – Input, output and PLL state machine interaction	92
Figure 21 – PLL state diagram	98
Figure 22 – OUTPUT state diagram	102
Figure 23 – INPUT state diagram	106
Figure 24 – Treatment of an alarm in the DP system	139
Figure 25 – Load Region state diagram for erasable memory	237
Figure 26 – Load region state diagram for non erasable memory	238
Figure 27 – Function invocation state diagram	270
Figure 28 – System architecture	284
Figure 29 – Assignment of communication relationship to application relationship	291
Figure 30 – MS0 application relationship	297
Figure 31 – Output buffer model of a DP-slave without sync functionality	298
Figure 32 – Output buffer model of a DP-slave with sync functionality	298
Figure 33 – Input buffer model of a DP-slave without freeze functionality	299
Figure 34 – Input buffer model of a DP-slave with freeze functionality	299
Figure 35 – MS1 application relationship	300
Figure 36 – MS2 application relationship	300
Figure 37 – Example of inter-network communication	302
Figure 38 – Example without inter-network addressing	302
Figure 39 – First example with inter-network addressing	303
Figure 40 – Second example with inter-network addressing	304
Figure 41 – MS3 application relationship	305
Figure 42 – MM1 application relationship	305
Figure 43 – MM2 application relationship	306
Figure 44 – Cycle time of the DP system	437
Table 1 – Requirements and features of fieldbus DP	34
Table 2 – Status values of the service primitives	51
Table 3 – Access Rights MS1	54
Table 4 – Access Rights MS2	54
Table 5 – Access Rights MS1	57
Table 6 – Access Rights MS2	57
Table 7 – SCL matching rules	58
Table 8 – Read	58
Table 9 – Write	60
Table 10 – Data transport	61
Table 11 – Format (simple input data description)	65
Table 12 – Consistency (simple input data description)	65
Table 13 – Format (simple output data)	67
Table 14 – Consistency (simple output data)	67
Table 15 – Format (extended input data)	68
Table 16 – Consistency (extended input data)	69

Table 17 – Format (extended output data)	70
Table 18 – Consistency (extended output data)	71
Table 19 – Set Input	72
Table 20 – Read Input	72
Table 21 – Get Input	74
Table 22 – New Input	75
Table 23 – Set Output	76
Table 24 – Final	77
Table 25 – Read Output	77
Table 26 – Get Output	78
Table 27 – Clear Flag	78
Table 28 – New Flag	79
Table 29 – New Output	79
Table 30 – Clear Flag	79
Table 31 – Global Control	80
Table 32 – Clear Command	80
Table 33 – Sync Command	80
Table 34 – Freeze Command	81
Table 35 – New publisher data	81
Table 36 – Get publisher data	82
Table 37 – New Flag	82
Table 38 – SYNCH	83
Table 39 – SYNCH Delayed	83
Table 40 – DX Finished	84
Table 41 – SYNCH Event	84
Table 42 – Status	84
Table 43 – Primitives issued by the AL to the PLL state machine	94
Table 44 – Primitives issued by the user to the PLL state machine	94
Table 45 – Allowed values of Status	94
Table 46 – Primitives issued by the user to the input state machine	95
Table 47 – Primitives issued by the user to the output state machine	95
Table 48 – Primitives issued by the PLL to the output state machine	95
Table 49 – Primitives issued by the output to the PLL state machine	95
Table 50 – Primitives issued by the PLL to the input state machine	95
Table 51 – Primitives issued by the output to the input state machine	96
Table 52 – Primitives issued by the output state machine to the AL	96
Table 53 – Primitives issued by the AL to the output state machine	96
Table 54 – Primitives issued by the input state machine to the AL	96
Table 55 – Primitives issued by the AL to the input state machine	96
Table 56 – PLL state table	99
Table 57 – OUTPUT state table	103
Table 58 – INPUT state table	107
Table 59 – Identifier status	109

STANDARD PREVIEW

(standards.iteh.ai)

SIST EN 61158-5-3:2012

[https://standards.iteh.ai/catalog/standards/sist/d1e5768-cc25-4c17-9763-](https://standards.iteh.ai/catalog/standards/sist/d1e5768-cc25-4c17-9763-478d57960ad1/sist-en-61158-5-3-2012)

[478d57960ad1/sist-en-61158-5-3-2012](https://standards.iteh.ai/catalog/standards/sist/d1e5768-cc25-4c17-9763-478d57960ad1/sist-en-61158-5-3-2012)

Table 60 – Channel type	110
Table 61 – IO type	111
Table 62 – Status type	111
Table 63 – Status specifier	112
Table 64 – Status specifier	113
Table 65 – Module status	113
Table 66 – Status specifier	114
Table 67 – Link status	114
Table 68 – Link error	115
Table 69 – Set Slave Diag	116
Table 70 – Ext Diag Flag	117
Table 71 – Get Slave Diag	119
Table 72 – Read Slave Diag	128
Table 73 – New Slave Diag	138
Table 74 – Alarm type	140
Table 75 – Add Ack	141
Table 76 – Alarm specifier	141
Table 77 – Alarm notification	142
Table 78 – Alarm Ack	143
Table 79 – Prm data type	148
Table 80 – Supported feature	158
Table 81 – Supported profile feature	158
Table 82 – Role	159
Table 83 – Check user Prm	160
Table 84 – Prm structure	161
Table 85 – MS1 Command	164
Table 86 – Check user Prm result	165
Table 87 – Status values	166
Table 88 – Check Ext user Prm	167
Table 89 – Check Ext user Prm result	170
Table 90 – Status values	171
Table 91 – Check Cfg	171
Table 92 – Check Cfg result	172
Table 93 – Status values	173
Table 94 – Set Cfg	173
Table 95 – Get Cfg	174
Table 96 – Set Slave Add	175
Table 97 – Initiate	176
Table 98 – Abort	179
Table 99 – Instance	179
Table 100 – MS0 init DP-slave	180
Table 101 – MS1 init DP-slave	180
Table 102 – MS2 init DP-slave	181

STANDARD PREVIEW
(standards.iteh.ai)

SIST EN 61158-5-3:2012
<https://standards.iteh.ai/catalog/standards/sist/d1e5768-cc25-4c17-9763-478d57960ad1/sist-en-61158-5-3-2012>

Table 103 – DP-slave started.....	181
Table 104 – Alarm limit	182
Table 105 – DP-slave stopped	182
Table 106 – Reset DP-slave	183
Table 107 – DP-slave fault.....	183
Table 108 – Application ready DP-slave.....	183
Table 109 – Start subscriber	184
Table 110 – Stop subscriber	184
Table 111 – Publisher active.....	185
Table 112 – Status.....	186
Table 113 – Init DP-master CI1	186
Table 114 – DP-master CI1 started	187
Table 115 – Alarm limit	188
Table 116 – DP-master CI1 stopped	188
Table 117 – Reset DP-master CI1	188
Table 118 – DP-master CI1 fault	189
Table 119 – DP-master CI1 reject	189
Table 120 – Set mode DP-master CI1	190
Table 121 – DP-master CI1 mode changed	191
Table 122 – Load bus Par DP-master CI1	192
Table 123 – Mark DP-master CI1	193
Table 124 – Abort DP-master CI1	193
Table 125 – Read value DP-master CI1	194
Table 126 – Delete SC DP-master CI1	194
Table 127 – DP-master CI1 event	195
Table 128 – Init DP-master CI2	196
Table 129 – Reset DP-master CI2.....	197
Table 130 – DP-master CI2 fault	197
Table 131 – DP-master CI2 reject	197
Table 132 – DP-master CI2 closed.....	198
Table 133 – DP-master CI2 event	198
Table 134 – USIF state	199
Table 135 – Data rate	203
Table 136 – USIF state	204
Table 137 – Isochronous mode	204
Table 138 – Slave type	207
Table 139 – Alarm mode	208
Table 140 – Get Master Diag	211
Table 141 – MDiag identifier	211
Table 142 – Start Seq	212
Table 143 – Area code (start seq).....	213
Table 144 – Download	214
Table 145 – Upload.....	215

Table 146 – End Seq	216
Table 147 – Act Para Brct.....	217
Table 148 – Area code (Act Para Brct).....	217
Table 149 – Act param.....	218
Table 150 – Area code (Act param)	219
Table 151 – Activate	219
Table 152 – Access rights MS1.....	221
Table 153 – Access rights MS2.....	222
Table 154 – Load region state	222
Table 155 – Initiate load	224
Table 156 – Default values for the parameter Intersegment Request Timeout.....	225
Table 157 – Push segment	226
Table 158 – Pull segment	228
Table 159 – Terminate load	230
Table 160 – Primitives issued by the user to the Load Region state machine.....	232
Table 161 – Primitives issued by the Load Region state machine to the user.....	233
Table 162 – Primitives issued by the Function Invocation to the Load Region state machine.....	233
Table 163 – Primitives issued by the Load Region to the Function Invocation state machine.....	234
Table 164 – Load Region state definitions	234
Table 165 – Load Region function table.....	235
Table 166 – Load Region state table for erasable memory.....	238
Table 167 – Load Region state table for non erasable memory.....	250
Table 168 – Access rights MS1.....	255
Table 169 – Access rights MS2.....	255
Table 170 – Function Invocation state.....	256
Table 171 – Load Region object in use	256
Table 172 – Access rights MS1.....	257
Table 173 – Access rights MS2.....	258
Table 174 – Load Region object in use	258
Table 175 – Start.....	259
Table 176 – Stop	260
Table 177 – Resume.....	261
Table 178 – Reset	262
Table 179 – Get FI state	263
Table 180 – Call	264
Table 181 – Primitives issued by the user to the Function Invocation state machine	266
Table 182 – Primitives issued by the Function Invocation state machine to the user	267
Table 183 – Primitives issued by the Load Region to the Function Invocation state machine.....	267
Table 184 – Primitives issued by the Function Invocation to the Load Region state machine.....	268
Table 185 – Function Invocation state definitions.....	268

Table 186 – Function definitions	269
Table 187 – Function Invocation state table	270
Table 188 – CS status	286
Table 189 – Summertime	286
Table 190 – Synchronization active.....	287
Table 191 – Announcement hour	287
Table 192 – Summertime	288
Table 193 – Accuracy	288
Table 194 – Set time.....	289
Table 195 – Sync interval violation	290
Table 196 – Parameter of Initiate service without inter-network addressing.....	303
Table 197 – Parameter of Initiate service with inter-network addressing (first example)	303
Table 198 – Parameter of Initiate service with inter-network addressing (second example).....	304
Table 199 – AR type	310
Table 200 – Sync supported	312
Table 201 – Freeze supported	312
Table 202 – Group identifier	314
Table 203 – DPV1 enabled	314
Table 204 – Fail safe	315
Table 205 – WD base	315
Table 206 – No Add change.....	317
Table 207 – Alarm mode supported	320
Table 208 – Isochronous mode supp.....	324
Table 209 – Isochronous mode	324
Table 210 – Alarm mode	325
Table 211 – Time device type	326
Table 212 – S_SAP_index	329
Table 213 – D_addr	330
Table 214 – Service_activate	330
Table 215 – Role_in_service.....	331
Table 216 – Indication_mode	332
Table 217 – Max_DLSDU_length_req_low	332
Table 218 – Max_DLSDU_length_req_high.....	333
Table 219 – Max_DLSDU_length_ind_low	333
Table 220 – Max_DLSDU_length_ind_high	334
Table 221 – S_SAP_index	339
Table 222 – D_SAP_index	339
Table 223 – D_addr	340
Table 224 – Service_activate	340
Table 225 – Role_in_service.....	341
Table 226 – Indication_mode	341
Table 227 – Max_DLSDU_length_req_low	342

Table 228 – Max_DLSDU_length_req_high.....	342
Table 229 – Max_DLSDU_length_ind_low	343
Table 230 – Max_DLSDU_length_ind_high	343
Table 231 – Sync.....	344
Table 232 – Freeze.....	345
Table 233 – DPV1 enabled	346
Table 234 – Fail safe	346
Table 235 – Enable publisher.....	347
Table 236 – WD base	347
Table 237 – Alarm mode.....	348
Table 238 – Fail safe	358
Table 239 – S_SAP_index	365
Table 240 – D_SAP_index	366
Table 241 – D_addr	366
Table 242 – Service_activate.....	366
Table 243 – Role_in_service.....	367
Table 244 – Max_DLSDU_length_req_low	367
Table 245 – Max_DLSDU_length_req_high.....	367
Table 246 – Max_DLSDU_length_ind_low	368
Table 247 – Max_DLSDU_length_ind_high	368
Table 248 – DLL init DP-slave	369
Table 249 – Load ARL DP-slave	370
Table 250 – Get ARL DP-slave	376
Table 251 – Set ARL isochronous mode	382
Table 252 – Load ARL DP-master CI1	383
Table 253 – Get ARL DP-master CI1.....	386
Table 254 – ARL Slave update DP-master CI1.....	388
Table 255 – Load ARL DP-master CI2	390
Table 256 – Get ARL DP-master CI2.....	391
Table 257 – Load CRL DP-slave	392
Table 258 – Load CRL DXB link entries	394
Table 259 – Get CRL DP-slave	395
Table 260 – Load CRL DP-master CI1	397
Table 261 – Get CRL DP-master CI1	410
Table 262 – CRL Slave activate.....	423
Table 263 – CRL Slave new Prm	424
Table 264 – CRL Slave new Prm data.....	425
Table 265 – Load CRL DP-master CI2	427
Table 266 – Get CRL DP-master CI2	429
Table 267 – Fieldbus AL class summary	430
Table 268 – Assignment of the services to DP-masters and DP-slaves	432
Table 269 – Support of AR types in the different DP-device types.....	433
Table 270 – Support of services at the different AREPs respectively CREPs	434